

Name: _____

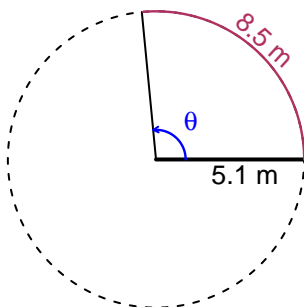
Date: _____

Trig Final (SLTN v630)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 8.5 meters. The radius is 5.1 meters. What is the angle measure in radians?

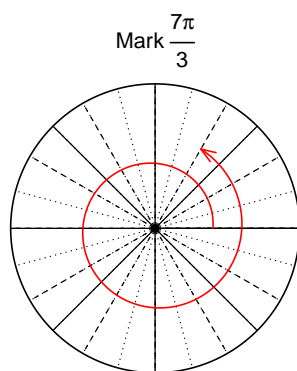


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$\theta = 1.667$ radians.

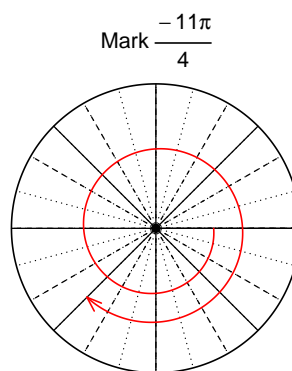
Question 2

Consider angles $\frac{7\pi}{3}$ and $-\frac{11\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{7\pi}{3}\right)$ and $\cos\left(-\frac{11\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(7\pi/3)$

$$\sin(7\pi/3) = \frac{\sqrt{3}}{2}$$



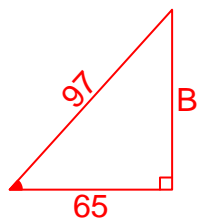
Find $\cos(-11\pi/4)$

$$\cos(-11\pi/4) = \frac{-\sqrt{2}}{2}$$

Question 3

If $\cos(\theta) = \frac{-65}{97}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

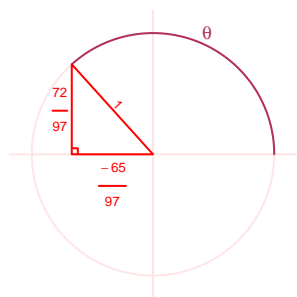
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}65^2 + B^2 &= 97^2 \\ B &= \sqrt{97^2 - 65^2} \\ B &= 72\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{72}{97}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 4.86 Hz, an amplitude of 7.44 meters, and a midline at $y = -2.71$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.44 \sin(2\pi 4.86t) - 2.71$$

or

$$y = 7.44 \sin(9.72\pi t) - 2.71$$

or

$$y = 7.44 \sin(30.54t) - 2.71$$